

Claims

[c1] 1. The invention has been described in detail with particular reference to certain preferred embodiments thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention.

a circular disk which includes a circular attenuating portion that surrounds a rotational axis of the disk, said circular attenuating portion being divided into at least a first light attenuating section which provides a first amount of light attenuation when the first light attenuating section is placed at an optical path of a light source, and a second light attenuating section which provides a second amount of light attenuation which is different from the first amount of light attenuation when the second light attenuating section is placed at said optical path of the light source;

said circular disk further including a circular shutter portion which surrounds said circular attenuating portion, said shutter circular shutter portion blocking light from said light source when the circular shutter portion is placed at said optical path.

[c2] 2. A disk assembly according to claim 1 , further comprising:

a motor for rotating the circular disk around said rotational axis; and

a linear movement cylinder adapted to move the circular disk in a direction perpendicular to the optical path, said linear movement cylinder moving the disk between an attenuator position in which one of said first or second light attenuating sections is at said optical path and a shuttered position in which said circular shutter portion is at said optical path;

wherein:

said motor is adapted to rotate said circular disk to a desired attenuator position in which one of said first or second light attenuating sections is at said optical path when said circular disk is at said attenuator position, and said linear movement cylinder is adapted to move said disk between the shuttered position and said desired attenuator position.

[c3] 3. A disk assembly according to claim 1 , wherein said first light attenuating section comprises a plurality of first holes having a first size and said second light attenuating section comprises a plurality of second holes having a second

size which is greater than said first size.

[c4]

4. A disk assembly according to claim 1 , wherein said attenuating portion further comprises a third attenuating section and a fourth section which defines an unattenuated section, a first one of said first to fourth sections comprising a plurality of first holes having a first size, a second one of said first to fourth sections comprising a plurality of second holes having a second size, a third one of said first to fourth sections comprising a plurality of third holes having a third size, and a fourth one of said first to fourth sections comprising a single hole which is sized to allow all the light from the light source to pass therethrough.

[c5]

5. A combination shutter and attenuator disk assembly for use in an imaging apparatus, the disk assembly comprising:
a circular disk which includes attenuation means for providing at least a first and a second amount of light attenuation for light from a light source, and a shutter means for blocking the light from the light source;
first moving means for moving said circular disk between a first position in which said attenuation means is at an optical path of an optical assembly, and a second position in which said shutter means is at said optical path; and
second moving means for rotating said circular disk to a desired attenuation position when said circular disk is in said first position.

[c6]

6. A combination shutter and attenuator disk for use in an imaging apparatus, the disk comprising:
a circular attenuating portion that surrounds a rotational axis of the disk, said circular attenuating portion comprising a plurality of attenuating sections having different light attenuating properties; and
a circular shutter portion which surrounds said circular attenuating portion and is adapted to block light.

[c7]

7. A disk according to claim 6 , wherein each of said attenuating sections comprise holes of varying sizes and said shutter portion comprises a solid surface which surrounds said holes of said attenuating portion.

[c8]

8. A method of alternatively attenuating and blocking light from a light source in an imaging apparatus, the method comprising the steps of:
linearly moving a circular disk having a plurality of attenuating sections with different light attenuating properties to an attenuating position in which one of the attenuating sections is at an optical path of an optical assembly and a light source, said circular disk further comprising a shutter portion which surrounds said attenuating sections;
rotating the circular disk until a desired one of said attenuating sections is aligned with said optical path to provide for a desired amount of light attenuation; and
linearly moving the circular disk between said attenuating position and a shuttering position in which the shutter portion of said circular disk is at said optical path to block light from the light source.

[c9]

9. An imaging apparatus comprising:
a light source;
an optical system having an optical axis which extends along an optical path, said optical system focusing light from said light source; and
a combination shutter and attenuator disk positioned between said light source and said optical system, said combination shutter and attenuator disk comprising:
a circular attenuating portion that surrounds a rotational axis of the disk, said circular attenuating portion comprising a plurality of attenuating sections having different light attenuating properties for attenuating light from said light source; and
a circular shutter portion which surrounds said circular attenuating portion and is adapted to block light from said light source.

[c10]

10. An imaging apparatus according to claim 9 , further comprising:
a motor for rotating the disk around said rotational axis; and
a linear movement cylinder adapted to move the disk in a direction perpendicular to the optical axis, said linear movement cylinder moving the disk between an attenuator position in which one of said plurality of attenuating sections is at said optical path and a shuttered position in which said circular

shutter portion is at said optical path;

wherein:

said motor is adapted to rotate said disk to a desired attenuator position in which a desired one of said attenuating sections is at said optical path when said circular disk is at said attenuator position, and said linear movement cylinder is adapted to move said disk between the shuttered position and said attenuator position.

- [c11] 11. An imaging apparatus according to claim 9 , wherein each of said attenuating sections comprise holes of varying sizes and said shutter portion comprises a solid surface which surrounds said holes of said attenuating portion.
- [c12] 12. An imaging apparatus according to claim 9 , wherein said imaging apparatus is a printer.
- [c13] 13. An imaging apparatus according to claim 9 , wherein said imaging apparatus is a scanner.
- [c14] 14. An imaging apparatus according to claim 9 , wherein said shutter cylinder is an air cylinder.
- [c15] 15. A combination shutter and attenuator disk assembly for use in an imaging apparatus, the disk assembly comprising:
a circular disk which includes a circular attenuating portion, said circular attenuating portion being divided into at least a first light attenuating section which provides a first amount of light attenuation when the first light attenuating section is placed at an optical path of a light source, and a second light attenuating section which provides a second amount of light attenuation which is different from the first amount of light attenuation when the second light attenuating section is placed at said optical path of the light source;
said circular disk further including a circular shutter portion, said shutter circular shutter portion blocking light from said light source when the circular shutter portion is placed at said optical path.